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June 9, 2014

Ref: EPR-N

Rena Brand, Denver Regulatory Office
U.S. Army Corps of Engineers
9307 South Wadsworth Blvd.
Littleton, CO 80128

Re: Moffat Collection System Project Final Environmental Impact Statement, CEQ #20140129

Dear Ms. Brand:

The U.S. Environmental Protection Agency Region 8 appreciates the opportunity to review the U.S. Army Corps of Engineers' (Corps') Moffat Collection System Project (Project) Final Environmental Impact Statement (EIS). We are providing comments consistent with our authority under Section 102(2)(C) of the National Environmental Policy Act (NEPA), Section 309 of the Clean Air Act and Section 404 of the Clean Water Act (CWA).

Project Background

The Final EIS analyzes six alternatives for the Moffat Project, with the purpose to provide 18,000 acre-feet (AF) per year of new, firm yield to the Moffat Treatment Plant and raw water customers. The 18,000 AF partially addresses an estimated shortfall of 34,000 AF per year in water supply that is projected from 2016 to 2030. The remaining 16,000 AF per year of estimated shortfall will be addressed through conservation efforts. The Proposed Action (Denver Water's preferred alternative - Alternative 1a) entails expansion of Gross Reservoir by 77,000 AF (72,000 AF plus a 5,000 AF Environmental Pool) to accommodate the diversion of average to wet-year water from the Fraser River Basin, Williams Fork River Basin and South Boulder Creek via the Moffat Tunnel and South Boulder Creek. This Final EIS includes new information on current conditions, including the magnitude and effect of existing withdrawals on the West Slope, and an improved analysis of hydrologic alteration and potential for threshold changes to flow and aquatic life.

The comments provided in this letter are all within the scope of concerns expressed in our Draft EIS comment letter, dated March 17, 2010, and focus on only the most significant of those concerns. As a Cooperating Agency on this Project, the EPA provided timely, specific input, including detailed recommendations on how to ensure adequate impact analysis and mitigation to satisfy both NEPA and CWA Section 404, while avoiding project delays. The EPA was not asked to engage or assist in design or concurrence of the proposed mitigation and this letter provides the EPA's first review and comment on mitigation since the Draft EIS.

EPA Comments

This letter and enclosed Detailed Comments reinforce the primary concern as stated in the EPA's Draft EIS letter that the Project would adversely impact water quality and aquatic resources in an already degraded system. The EIS describes all mitigation as conceptual, and does not include mitigation commitments for some Project impacts that are significant to regulatory requirements of the CWA. While there is considerable analysis provided in this EIS, in several cases, the analyses do not provide a sufficient basis to determine or recommend the mitigation necessary to ensure compliance with the CWA regulations. In other cases, the information and analyses in the Final EIS disclose incremental effects of the Project that exacerbate existing and projected degraded conditions, yet there is no analysis to confirm that the mitigation proposed will offset those impacts or replace the lost functions and resources.

These comments are intended to inform the Record of Decision (ROD) for this EIS, as well as the CWA Section 404 permit and may be useful for the State's CWA Section 401 Certification. The concerns outlined in this letter are pertinent to demonstrating compliance with the CWA Section 404(b)(1) implementing regulations (40 CFR § 230.10). Documenting CWA Section 404 regulatory compliance would include: demonstration of minimization of impacts to Waters of the U.S. and mitigation for any unavoidable adverse impacts to Waters of the U.S., including design features and mitigation commitments that offset Project effects (40 CFR § 230.10(d)); demonstration that the Project will not cause or contribute to violation of State Water Quality Standards (WQS); (40 CFR § 230.10(b)); and demonstration that the Project will not cause or contribute to significant degradation of Waters of the U.S. (40 CFR § 230.10(c)). Our comments focus on the following areas: 1) concerns with the Project's impacts to stream temperature, water quality and aquatic resources that would contribute to impairments and exceedances in the Upper Colorado basin, including the Fraser River and Williams Fork watersheds and Three Lakes System; 2) information necessary to demonstrate compliance with the CWA Section 404 (b)(1) implementing regulations; and, 3) concerns with mitigation and demonstration of mitigation sufficiency for some Project impacts.

Analysis of Impacts to Water Quality and Aquatic Resources

The characterization of Current Conditions in the Final EIS illustrates the impact of existing withdrawals on West Slope water resources, the potential for many of the affected rivers and streams to have already crossed ecological tipping points, and supports the EPA's concern about the Project's potential to contribute to the significant degradation of stream systems below Denver Water diversions in the Fraser and Williams Fork watersheds and the Upper Colorado River.

Under the action alternatives, the Final EIS states that changes in streamflow in the Fraser and Williams Fork River basins would be greatest (*i.e.*, moderate to major) during average and wet years (p. ES-13), especially years which follow drought or dry years. In some cases, this would increase the frequency and duration of dry year conditions. The Project will divert most heavily in the runoff months of May, June and July. For example, in the St. Louis Creek tributaries, the existing condition diverts 67% of annual average native flows, and an additional 42% will be diverted in average years due to the proposed action. In the Fraser River at the Winter Park gage, the monthly average flows would decrease by a maximum of 22.6 cfs, or 43%, in June. The increased withdrawals will cause a significant decrease in the duration of both small and large floods, particularly along tributaries to the Fraser River and

Williams Fork River, and a substantial increase in the number of zero flow days downstream of the diversions in these streams. Because the Project will further exacerbate the effects of existing water withdrawals in wet and average years (Appendix H-3), it has the potential to affect aquatic resources and water quality in an already degraded ecosystem, which is central to the focus of our comments outlined below and in the enclosed Detailed Comments.

Temperature

The water temperature analysis presented in the Final EIS is described as the product of a multi-phase process involving Cooperating Agencies (p. 4-201). Although the EPA, as a Cooperating Agency, provided review of preliminary temperature analysis materials, the analysis in the Final EIS is not responsive to the concerns provided to the Corps in 2012 through a series of communications and meetings. It is our understanding that some concerns may be addressed outside of the NEPA process through the development of a dynamic temperature model to support the State's CWA Section 401 Certification process. The EPA's overall assessment of the presented water-temperature potential impacts in the Final EIS is that it uses analytical approaches that do not accurately predict temperature effects, and does not support the Final EIS's impact conclusions. The enclosed Detailed Comments for temperature analysis focus on the three-phase analysis in the Final EIS and describe deficiencies in the analytical approach. We anticipate that the forthcoming dynamic temperature analysis has the potential to provide more useful and accurate assessment of the Project's temperature impacts.

Nutrients

Three Lakes. The EPA is concerned that the Project may contribute to WQS exceedances in the "Three Lakes" system. Each of the Three Lakes, Grand Lake, Granby, and Shadow Mountain, currently has a problem that could be exacerbated by increased nutrients, including total nitrogen (TN) and total phosphorus (TP). Because clarity is a concern in Grand Lake, Shadow Mountain is impaired for dissolved oxygen (DO), and Granby Reservoir is impaired for mercury, any change that could exacerbate or contribute to these impairments is significant and, under the CWA, is to be avoided or offset. Although the Final EIS projects that no more than 2% of the cumulative predicted change in the constituents is attributed to the proposed action, any increase in nutrient transport to the Three Lakes associated with the Project is expected to contribute to existing impairments, specifically the CWA Section 303(d) impairment for DO in Shadow Mountain. The Final EIS analysis indicates that DO exceedances will increase in the 2022 projection; however, the Final EIS may underestimate the extent of future exceedances based on the following: 1) Current Conditions in the Final EIS do not reflect existing exceedances and the associated CWA Section 303(d) impairment; 2) the Project will cause further reduction of flow and reservoir storage (as a result of additional withdrawals from the Fraser basin); and 3) the analysis under-predicts standards exceedances (p. 4-197, Figure 4.6.2-7). The EPA has provided specific details and recommendations on use of available data and mitigation in the enclosed Detailed Comments.

Fraser Watershed. The EPA is concerned with the potential nutrient impacts in the Fraser River watershed because nutrient levels presented in the Final EIS for both the Current and Full Use with Project Condition are exceeding or approaching thresholds associated with adverse effects, there is uncertainty associated with the predicted levels, and the scope of the analysis did not include all streams where impacts are occurring. The Project may increase nutrient concentrations in the Fraser River Watershed that, although small, contribute to water quality problems in the Three Lakes System and the Fraser River watershed. Additional information and recommendations are provided in the enclosed Detailed Comments.

<u>Metals</u>

The Detailed Comments include several additional water quality concerns associated with the Project:

- By reducing dilution flow to the Fraser River, the Project has the potential to exacerbate existing exceedances of metals standards, including copper, iron and lead. The Fraser River is identified for copper and lead exceedances on the State's "monitoring and evaluation" list.
- The Final EIS describes gaps in water quality data availability that in some cases do not allow for an understanding of how pollutant concentrations may vary by season or with flow changes. Understanding these relationships is important to determining the likelihood and magnitude of Project effects to these water quality parameters.

<u>Aquatic Resources</u>

The expanded analysis provided in the Final EIS provides a clearer picture of the potential direct, indirect, and cumulative effects associated with the action alternatives on aquatic resources. We are concerned that the impacts to the stream ecosystems on the West Slope may be more substantial than outlined and characterized in the Final EIS. While we understand that the Final EIS has identified many of the Project's aquatic resource impacts as "minor," under the definitions provided in the Final EIS, these impacts in the Fraser and Williams Fork River watersheds and the Upper Colorado River are occurring in a system that is already significantly degraded and adversely affected by water withdrawals. For example, within the affected area, the Fraser River from its source to the Rendevous Bridge and Vasquez Creek are identified as impaired for aquatic life as a provisional listing on the State's CWA Section 303(d) List, and the Colorado River from the Windy Gap outlet to the 578 Road Bridge is listed for "monitoring and evaluation." The incremental effects of the Project will contribute to further degradation if mitigation is not provided that offsets the functions and habitat areas lost. Thus, in order for the Project to be permitted under the CWA Section 404 regulations, the incremental effects will require mitigation or minimization measures sufficient to ensure the Project does not contribute to significant degradation or contribute to violations of WQS (40 CFR 230.10).

As we stated in our April 8, 2010 comment letter on the CWA Section 404 permit, because the proposed action will include additional withdrawals from both the Fraser and Williams Fork Rivers and 34 perennial headwater tributaries, the combined influence of these simultaneous withdrawals will have substantial impacts on the downstream receiving mainstem Fraser and Colorado Rivers and their associated aquatic ecosystems. Without additional compensatory mitigation, the combined effect of additional water withdrawals from all tributaries to the Fraser and Williams Fork will have adverse effects on water quality and aquatic resources in the Fraser and Williams Fork Rivers and their tributaries. The only mitigation proposed for impacts to aquatic biological resources is $750,000 for stream habitat restoration projects in the Fraser and upper Williams Fork Rivers (Appendix M). The Final EIS does not clearly demonstrate how the monetary contribution was determined or how it will offset the functional and habitat losses of the Project. We recommend that, through the CWA Section 404 permitting process, the Corps clearly document how the incremental effects of the Project to West Slope streams will be offset, including the "minor" impacts identified above. We anticipate additional mitigation will be needed to fully offset all of the incremental Project effects and ensure the Project does not contribute to significant degradation. Additional mitigation measures may include additional system modifications (*e.g.*, bypass flows in dewatered stream systems, flushing flows, additional habitat restoration opportunities, change in withdrawal locations, etc.).

On the East Slope, the Project will have adverse impacts to tributary streams and special aquatic sites associated with expansion of Gross reservoir including South Boulder Creek (5000 linear feet), Forsythe Canyon (1350 linear feet), and Winiger Gulch (2160 linear feet). Riffle pool complexes within the inundated portion of South Boulder Creek represent valuable habitat for fish and wildlife (40 CFR 230.45(a)) and are considered difficult-to-replace aquatic resources (DTRs) under the 2008 mitigation rule (40 CFR 230.93e(3)). The Final EIS acknowledges the major adverse impact to fish and macroinvertebrate communities in these streams (p. 5-436). Proposed mitigation for this aquatic resource loss in lower South Boulder Creek is largely out-of-kind mitigation in the reservoir and additional flows in lower South Boulder Creek. Per the CWA Section 404 mitigation rule (40 CFR Part 230 Subpart J), compensation should be provided through in-kind rehabilitation, enhancement, or preservation. Additional information regarding methods for replacing these DTRs is provided in the mitigation rule. Because compensatory mitigation for DTRs is problematic, we recommend that mitigation design and selection be coordinated with the cooperating agencies to provide technical assistance in the adequate replacement or functions and values for these valuable resources.

Proposed Mitigation

Recognizing the impacts of historic and ongoing water transfers from the Colorado River Basin to the East Slope, Denver Water has made recent commitments to remedy some of the impact created by the present water withdrawal structure. By implementing the Colorado River Cooperative Agreement and other mitigation and enhancement related documents, Denver Water expects to measurably improve conditions in the Fraser Basin compared to the conditions currently experienced. While these actions are intended to improve the Full Use Condition of the Fraser Basin, monitoring and adaptive management will be necessary to assess their effect and verify the pre-Project, Full Use Condition, baseline. The EPA supports and applauds these measures as being beneficial to the Fraser system.

While acknowledging these positive measures, the EPA's review of this Final EIS evaluated whether there are mitigation commitments that assure the Project (*i.e.*, the future increased diversions for the Moffat Collection System associated with expansion of Gross Reservoir) can be implemented in compliance with the CWA Section 404 regulations. Importantly, proposed minimization or mitigation measures must be sufficient to assure that the Project itself does not cause or contribute to violations of WQS or significant degradation (40 CFR 230.10(b) and (c)). Our review:

- identified several pollutants for which there are no Project measures proposed to address associated impacts that, based on the analysis in the Final EIS, would potentially cause or contribute to violation of WQS (*i.e.*, dissolved oxygen, nutrients),
- identified temperature impacts for which it is not possible to judge the sufficiency of the measures proposed to prevent the Project from contributing to violation of WQS (*i.e.*, temperature numeric and narrative standards on the Fraser River and Ranch Creek),
- identified impacts to aquatic resources that could potentially contribute to significant degradation without appropriate mitigation (for purposes of 40 CFR 230.10(c)) in both South Boulder Creek, the Fraser and Williams Fork watersheds and the Upper Colorado River, for which the mitigation proposed has not been demonstrated to compensate for the Project contribution, and
- concluded that the proposed mitigation for inundation of riffle-pool complexes by the expansion of Gross Reservoir is not based on an evaluation of replacement of lost functions.

The CWA implementing regulations require compensatory mitigation to offset unavoidable adverse impacts to wetlands and streams authorized by CWA Section 404 permits resulting from both direct and indirect (secondary) impacts from the Project. For this Project to comply with the CWA and its implementing regulations, it will be necessary for the CWA Section 404 permitting process to resolve these issues and demonstrate how the proposed mitigation offsets the impacts to the aquatic ecosystem identified within the Project area.

The Final EIS describes conceptual mitigation in Appendix M-1. The measures described are largely those that have been proposed through the Colorado River Cooperative Agreement or the Fish and Wildlife Mitigation and Enhancement Plans. The mitigation that has been proposed has not been demonstrated to offset the Project's impacts to Waters of the U.S.. For example, 250 AF of flow to be implemented at a rate of 4 cfs is identified for temperature mitigation and yet there is no demonstration that that volume or rate of water is capable of providing the additional thermal buffering necessary to offset impacts. Without additional analysis, potentially provided by the forthcoming dynamic temperature modeling, it is not possible to determine whether proposed water temperature mitigation measures will prevent the Project from contributing to violations of the temperature WQSs.

The Conceptual Mitigation Plan in the Final EIS also includes a number of proposed commitments for additional monitoring, as well as a detailed description of the Learning by Doing (LBD) cooperative effort (along with the request to include Denver Water's active participation in LBD as a permit condition). The EPA supports this cooperative adaptive approach to management of the aquatic environment on a permanent basis. In addition to the monitoring commitments included in the conceptual plan, the detailed comments attached include a number of recommendations for additional data collection and monitoring efforts to support the LBD effort (*e.g.*, Full Use Condition Baseline and mitigation effectiveness/impact verification monitoring, current dissolved oxygen data for Shadow Mountain Reservoir, Fraser River nutrient and metals monitoring, additional temperature data collection).

There is inherent uncertainty in designing compensatory mitigation for a large and complex system like the upper Colorado River basin. We recommend adding an adaptive management plan as a permit condition to assure that mitigation, as it is implemented, will provide the required protections for CWA

Section 404 permit issuance and may be useful for CWA Section 401 Certification. This adaptive management plan should include thresholds, triggers for action, and specific commitment to mitigation actions for the resources covered by compensatory mitigation.

Next Steps

The EPA understands that the Corps intends to issue the CWA Section 404 permit concurrently with a ROD for both the NEPA and the CWA Section 404 decisions. In order to issue a permit, the Project must first receive a CWA Section 401 Certification from the Colorado Department of Public Health and the Environment (CDPHE). This Final EIS contains a draft analysis of CWA Section 404(b)(1) requirements (Appendix K) which utilizes information in the EIS to support its determinations. We are providing some preliminary evaluations of whether the Project is consistent with the CWA Section 404 regulations (enclosed). As we have previously communicated in March 17, 2010 and April 8, 2010 letters sent in accordance with Part IV, 3(b) of the Memorandum of Agreement (MOA) between the EPA and the Department of Army regarding CWA Section 404(q), the EPA has serious concerns regarding the adverse impacts to Aquatic Resources of National Importance (ARNI). We have also highlighted information in this letter and our Detailed Comments, as in our previous Draft EIS and CWA Section 404(q) MOA letters, that could be resolved through the CWA Section 401 Certification process necessary for CWA Section 404 permitting and the protection of water quality.

We hope that our comments on the Final EIS will facilitate future dialogue with the Corps, CDPHE and Denver Water to assure concerns are resolved prior to issuance of the CWA Section 404 permit and ROD so that the Project is compliant with CWA Section 404 and is protective of Waters of the U.S.. We remain available to work with you to design mitigation and monitoring to meet this goal. If you have any questions regarding our comments please contact me at (303) 312-6776, or you may contact Phil Strobel, Acting NEPA Program Director at (303) 312-6704, or Bert Garcia, Ecosystems Protection Program Director at (303) 312-6670.

Sincerely,

Martin Hestmark

Martin Hestmark
Assistant Regional Administrator
Office of Ecosystems Protection and Remediation

Enclosure: Detailed Comments
cc: Colonel Cross, Omaha District Corps
Jim Lochhead, Denver Water
Martha Rudolph, CDPHE
Oscar Martinez, U.S. Forest Service

MOFFAT COLLECTION SYSTEM PROJECT FINAL EIS:
EPA REGION 8's
DETAILED COMMENTS

I. Impact Analysis

A. Baseline. The Final EIS for the Moffat Collection System Expansion Project (Project) contains two effective baselines: the Current Condition (2006) and the Full Use Condition (initially 2016 and then 2022). The difference between these two baselines is the change in the condition of the environment associated with the Denver Water's increased, full utilization of its water storage capability prior to this Project and some reasonably foreseeable future actions (RFFAs) (p. 5-1). The Full Use Condition, which represents an anticipated condition not a measured and observed one, is used in Chapter 5 to assess Project effects.

The EPA considers use of an anticipated, future condition to be appropriate where the Full Use Condition can be predicted with some certainty (*i.e.*, where there are methods available to predict or model impacts and a sound basis for reasonably anticipated assumptions). The Final EIS notes that the literature does not support a predictive method to quantify a future condition that can be used as a baseline for aquatic resources. Where quantitative methods are not available, it is difficult to distinguish between the relative influences of the change prior to a new baseline versus the changes due to Project effects. A qualitative, anticipated baseline is not as useful for adaptive management as a measured, quantitative one. Because there are no quantitative or modeling methods available for estimating future conditions of, and future impacts to, aquatic resources we continue to recommend considering impacts against the Current Condition for these resources or confirm and quantify the predicted baseline with monitoring data prior to the Project coming online. Confirmation and quantification of the Full Use Condition through monitoring will address uncertainty associated with the Full Use Condition and provide a quantified baseline against which to measure change and enable adaptive management through approaches such as Learning by Doing (LBD).

Recommendation:

- Utilize Current Condition baseline to assess impacts for aquatic resources or conduct five years of pre-Project monitoring to confirm and quantify the Full Use Condition.

B. Temperature. To disclose the range of water temperature impacts likely to result from the Project, the Final EIS draws on both the three-phase water temperature analysis that is contained within the document, as well as the as yet unfinished dynamic temperature modeling that is being conducted in support of CDPHE's CWA Section 401 certification process. For example, the Executive Summary states "effects on stream temperature would range from negligible to moderate in the Fraser River Basin" (p. ES-38). The lower end of this impacts range (*i.e.*, negligible) is derived using the three-phase water temperature analysis detailed within the Final EIS. The upper end of this range of impacts (*i.e.*, moderate) is defined as a possible outcome of an unfinished and unpublished modeling effort, as the document states "it is anticipated that, if data can be obtained to support a multi-variable analysis considering the interplay between all of the factors affecting stream temperatures, this analysis *may* yield impacts up to moderate levels" (p. 4-217). Because the methodology used in the Final EIS is of concern (see evaluation below), and the dynamic temperature modeling is not complete, the information to support conclusions regarding water temperature impacts likely to result from the Project.

Outlined below, the analyses presented in the Final EIS are reviewed for sufficiency of technical approach and robustness for the intended purpose (*i.e.*, to assess potential water temperature changes likely to result from the Proposed Action with reasonably foreseeable future actions (RFFAs)).

1. Phase 1: *Identification of stream reaches of most concern based on historic water temperature data.* To evaluate stream segments where water temperatures might potentially approach or exceed water quality standards (WQS) for temperature due to the Proposed Action with RFFAs, the Final EIS developed a table to compare the past water temperature data against Colorado's acute and chronic WQS for temperature. The resultant Table 4.6.2-6 was then utilized to prioritize segments for further analysis. Where past data indicate exceedances of the standard, those segments were carried forward for further analysis (*e.g.,* two Ranch Creek segments and three Fraser River segments). In anticipation of potential water temperature impacts resulting from RFFAs between now and implementation of the Proposed Action, the table includes a threshold of "within 1°C of the state standard" as a secondary screen.

Importantly, there is no rationale presented as to why 1°C constitutes a reasonable buffer for stream warming attributable to RFFAs (including anticipated water temperature warming from climate change, additional water withdrawals, and potential loss of riparian shading resulting from the extensive beetle kill within the basin). This choice significantly reduces the spatial scope of the water temperature analysis that was ultimately conducted, eliminating from consideration stream reaches that are currently relatively close (but greater than 1°C) to water temperature thresholds (*e.g.,* Fraser River at CR8HD). Because this Project does not come on-line until 2022, the stream conditions in the upper Colorado watershed may likely be warmer than today due to additional withdrawals and a warming climate, therefore we advocate that the spatial scope of water temperature analyses be comprehensive enough to consider potential temperature impacts *in all streams from which the proposed Moffat project is likely to divert water*. Without an explanation of why a 1°C threshold is appropriate, the EPA does not recommend its use to substantiate the limited resultant spatial scope of the water temperature analysis. We recommend use of a threshold that is better explained and, most defensibly, informed by information regarding the anticipated water temperature response to the RFFAs described above.

2. Phase 2: *Evaluation of statistical relationships between: (a) stream temperature and stream flow, and (b) stream temperature and air temperature to determine whether either flow or air temperature could be used individually to predict changes in stream temperature.* In the second phase of the temperature analysis, several figures are presented to characterize the strength of the relationship between (a) stream temperature and stream flow (*e.g.,* Figures 4.6.2-10a, 11a, 20) and (b) stream temperature and air temperature at a given site (*e.g.*, Figures 4.6.2-10b, 11b, 21). Figure 4.6.2-20 is a typical example of this approach, and of how this approach is problematic (**Figure 1**). Although neither the methodology nor the figure captions specify the temporal scope of the data used, we are concerned that the stream temperature / stream flow analyses do not account for seasonality inherent in water temperature /stream flow relationships. Specifically, it appears that these figures plot *all* data from June through September / October, fitting a trendline through *all* of the data, resulting in a poor fit.

Figure 4.6.2-20
Relationship Between Flow and Water Temperature for Colorado River below Windy Gap

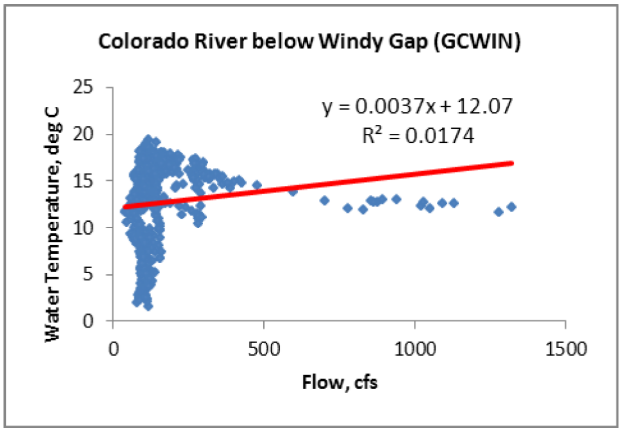

Figure 1: Example output of the Phase 2 approach used in the Moffat Final EIS to evaluate the statistical relationship between stream temperature and stream flow.

In contrast, when the EPA plotted all of the water temperature data from the Colorado River at Windy Gap against stream flow (2005-2010, June – October), identifying specific times of the year, the seasonality inherent in water temperature / flow / air temperature relationships is immediately evident (**Figure 2**). Specifically, during low flow conditions (*e.g.,* September / October), water temperatures are highly responsive to atmospheric drivers (see the wide vertical span of water temperatures measured at these very low flows). As such, a trend line resulting from a fit to *all* of the water temperature data regardless of the season in which it was collected, as was conducted during the Phase 2 water temperature analysis, will result in a poor fit.

Based in part on this analysis not accounting for seasonality, the Final EIS questionably concludes that "the results of these statistical analyses indicate that stream flow and water temperature do not have a strong correlation when isolated from other factors that affect stream temperatures in a natural setting (based on the low absolute value of the slopes and the very low R-squared values)" (p. 4-204) (**Figure 1**). On the contrary, what these figures indirectly demonstrate is an increased sensitivity (both in magnitude and range) of water temperature to atmospheric drivers during low flows. Further, the water temperature data appear to show a clearer decreasing relationship with increasing flow, once seasonality is better addressed (**Figure 2**).

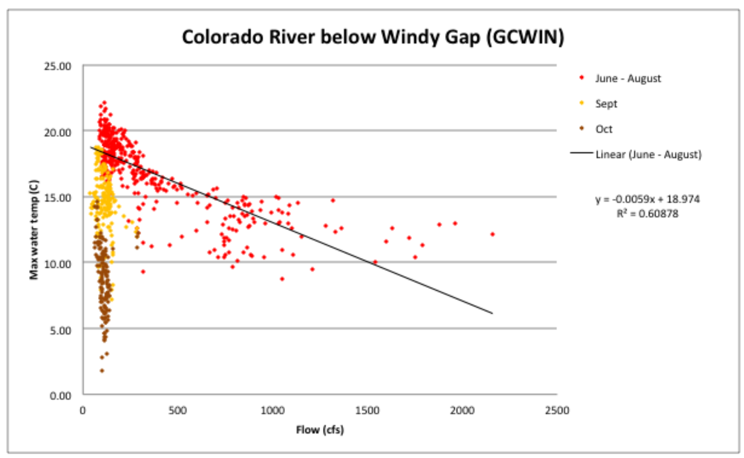

Figure 2: Importance of seasonality in evaluating the relationship between stream temperature and stream flow. Note that low-flow variability (compared to higher variability in meteorological conditions) during baseflow months results in a vertical band of water temperatures

In contrast to the conclusion in Phase 2 that stream flow and water temperature are poorly correlated, using the same simple linear regression analyses with air temperature and water temperature, the Final EIS concludes that air temperature is a much stronger predictor of water temperature, based on higher absolute values of the slopes and R-squared values. Importantly, the high absolute values of the R-squared values again result from not addressing the seasonality inherent in temperature data. For example, Figure 4.6.2-21 shows a linear regression between air and water temperatures measured at the Colorado River below Windy Gap, and highlights an R-squared value of 0.74 as evidence that water temperature closely follows air temperature (p. 4-241, **Figure 3**).

Figure 4.6.2-21
Relationship Between Air Temperature and Water Temperature for the Colorado River below Windy Gap

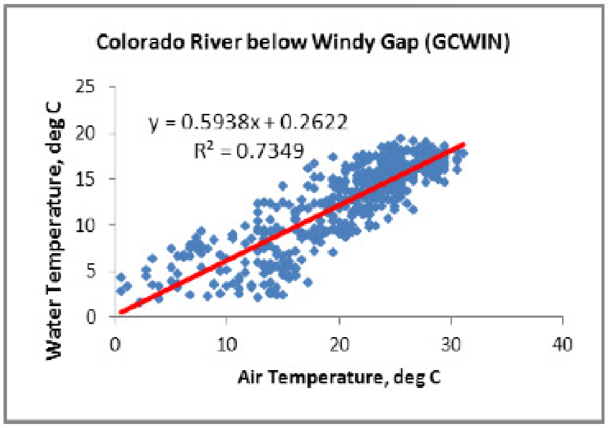

Figure 3: Example output of the approach used in Phase 2 of the Moffat FEIS to evaluate the statistical relationship between stream temperature and air temperature.

Although neither the methodology nor the figure captions are specific about the temporal scope of the data employed, it appears that the stream temperature / stream flow analyses do not account for seasonality inherent in water temperature / air temperature relationships. Figure 4 is the EPA's attempt to reconstruct Figure 4.6.2-21, with the separation of mid-summer months (June – August) from baseflow months (September and October). If a linear trend line is fit to the *entire* data set, the R-squared value in our data set (0.66) is similar to the one derived in the Final EIS for this site (0.73). The Final EIS argues that this result confirms that the air/water temperature relationship is "a much stronger relationship" than that between stream temperature and stream flow. The strength of correlation in this data set largely results from the inclusion of data from colder months (*i.e.,* September and October). Without these cooler months, the strength of correlation drops significantly (*i.e.,* June through August R-squared = 0.35).

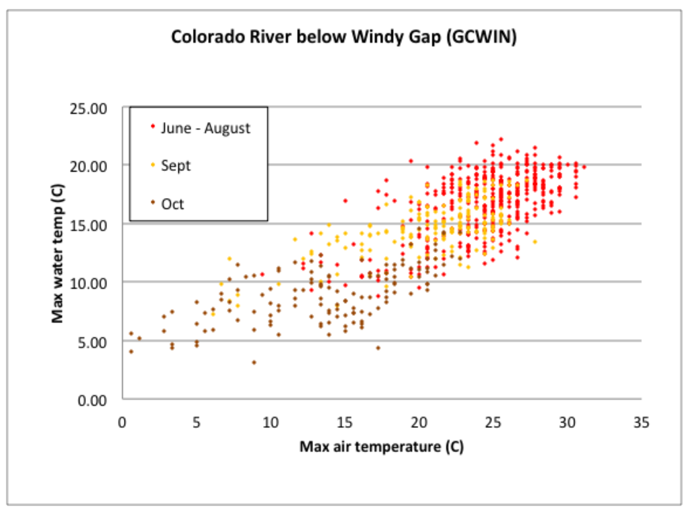

Figure 4: Importance of seasonality in evaluating the strength of relationship between measured stream and air temperatures.

In summary, because the Final EIS Phase 2 water temperature analysis does not address the influence of seasonality on water temperature / air temperature / stream flow relationships, scientifically supported conclusions regarding the relative importance of stream flow on instream water temperature in the Upper Colorado River Basin cannot be drawn. In order to understand this Project's impact on water temperature, this analysis gap will need to be further explored and resolved through the dynamic temperature modeling effort prior to the ROD and permit decision.

3. Phase 3*: Additional analysis of the three stream reaches with previous exceedances of stream temperature standards (two reaches of the Fraser River and one reach of Ranch Creek) to determine whether statistical relationships between stream temperature and stream flow are improved by isolating the analyses for narrow bands of air temperature.* The third phase of temperature analysis attempted to determine whether statistical relationships between stream temperature and stream flow could be improved by isolating simple linear regression analyses to a range of narrow bands of air temperature. Further, this third phase employed several "additional analyses" to attempt to assess this relationship. Our review determined the scientific approaches employed in Phase 3 did not accomplish the stated objective as detailed below:

- *Literature search.* The Final EIS refers to a literature search that was conducted to inform selection of tools for the consideration of the relative role of reduced flow in affecting instream water temperature. This literature search did not include several key manuscripts that indicate that the primary statistical model employed by Phases 2 and 3 (*i.e.,* simple linear regression) is not a robust enough method for this purpose. Typically, simple linear regression models are applied "for predicting or simulating water temperature at weekly, monthly, and annual time steps, relying mainly on the relatively high correlation between air and water temperature at these time scales" (Benyahya et al. 2007). In contrast, when water temperature modeling requires consideration at a daily time step, "both stochastic and deterministic models are most often found within the literature" (Caissie 2006). Further, because such deterministic models are based on mathematical representation of the underlying physics between the river and the surrounding environment (*e.g.,* using an energy budget approach), they are "more appropriate for analyzing different impact scenarios due to anthropogenic effects" (Benyahya et al. 2007).

  The Final EIS also incorrectly concludes, based upon this literature search, that "the top four variables that influence water temperature were considered for evaluation and are listed below *in order of importance*: 1) Air temperature; 2) Percent shade; 3) Relative humidity; 4) Flow." We are concerned that the phrase "listed in order of importance" oversimplifies the complex and site-specific influence of these highly inter-connected parameters on water temperature, particularly for evaluation of water temperature relationships across a diverse range of sites (*i.e.,* the Colorado River below Windy Gap is very different from the Fraser River near Winter Park). For example, the relative influence of stream discharge on water temperature is known to increase with increasing stream size as thermal inertia becomes more important, while the relative influence of riparian stream shading decreases as streams get wider (Table 3, Poole and Berman 2001; Webb et al. 2003). As noted above, deterministic models are designed to consider the relative importance of these influencing variables in an individual stream, where by design, simple linear regression models cannot.

  The Final EIS literature review also states that "a review of approved Total Maximum Daily Loads (TMDLs) for water temperature in mountainous streams (NMED 1999, 2002; UDEQ 2010) showed that loss of riparian vegetation, an increase in sedimentation, and reduction of late summer flows were identified as contributors to changes in water temperatures" (p. 4-

174). This line of evidence highlights the key role that stream flow plays as a co-determinant of instream water temperature regime.

- *Regression analysis.* As noted above in our augmented literature search, even broken into discrete air temperature bands, simple linear regression is not a robust enough tool to serve the purpose that it was employed for within the Final EIS (*i.e.,* to analyze the water temperature impacts of water removal at a daily time step). As such, the wide range and low strength of resultant trend line slopes evidenced in Figures 4.6.2-13, 4.6.2-14, and 4.6.2-23 are not surprising. However, utilizing this approach, sensitivity of water temperature to changes in flow within this system is evident in the increased strength and consistency of the relationship between flow and water temperature seen at the Colorado River below Windy Gap site (5^{th}-6^{th} order stream) when compared with the other sites (2^{nd}-3^{rd} order streams). At the Colorado River site, maximum daily water temperature appears to be consistently correlated with mean daily flow rate (Figure 4.6.2-23; R^2 values as high as 0.813 at the warmest air temperatures), with changes of approximately 3°C realized over the flow range analyzed in all air temperature bins. Further evidence that water temperatures in streams under the influence of the Project are sensitive to changes in flow is presented in the Final EIS for the Windy Gap project (and supporting technical documents), which relied on deterministic (or "dynamic") water temperature modeling within the Colorado River (BOR 2011; Hydros 2011).

  While acknowledging the increased strength in R-squared values and consistency between air temperature groups at the Colorado River site (p. 4-243), the Final EIS draws the conclusion that resultant small slopes are "within the measurement error of the water temperature data" and therefore indicate little correlation between water temperature and streamflow. It is important to note that the slopes of these regression lines are a function of both the x-axis (flow) and y-axis (water temperature), and that the units selected for the x-axis strongly influence the resultant slope. For example, if flow was reported in cubic meters per second, the calculated slopes would appear to be much larger. The conclusion that strength of relationship between flow and water temperature should be judged based on a comparison between the magnitude of a calculated slope and the instrument measurement accuracy is not useful. A more appropriate comparison would be to calculate the magnitude of temperature change associated with a change in flow anticipated to result from the Project (*e.g.*, reduction in flow of x cfs at a given location results in a water temperature change of y) and compare that value with the measurement accuracy of the instrument. For example, in an average July, the Full Use with Project Condition is anticipated to result in a flow change of approximately 100 cfs in the Colorado River at the Windy Gap diversion. As such, the slopes of the flow vs. water temperature regression line would need to be multiplied by 100 to assess the anticipated magnitude of difference in water temperature from current conditions.

  Finally, at one of the sites selected for analysis (Fraser River below Crooked Creek), mean daily water temperatures are regressed against *mean* daily flows (Figure 4.6.2-14). Presumably, this was done due to data limitations, however, the selection of the mean daily water temperature metric is not useful because less water in a stream would be expected to influence both warming and cooling of that water. As such, the mean daily water temperature would not be expected to be strongly influenced by a reduction of flow. Instead, metrics such as the amplitude of diurnal water temperature variation and maximum daily water temperature are more sensitive to changes in discharge (Gu 1998; Gu et al. 1998). It is therefore difficult to interpret the significance of the resultant analyses (Figure 4.6.2-14).

- *"Additional data evaluation."* In order to further examine the relationship between stream flow and stream temperature, the Final EIS employs "additional data evaluation." As an example, in Ranch Creek, "the first day of temperature exceedance was evaluated to determine if stream flow increased or decreased from the previous day. For the 29 periods of acute water temperature exceedances (DM), 16 indicated stream flow decreased from the previous day and 13 days indicated stream flow increased or stayed the same" (page 4-214). Based on this analysis, the Final EIS concludes that *"this further supports there being little to no direct statistical relationship between stream flow and water temperature at this site that can be isolated from other factors known to affect water temperature, to reliably predict water temperature*" (page 4-214). The same type of analysis was conducted with the Colorado River below Windy Gap data.

  It does not appear in either case that this additional data evaluation controlled for air temperature. The air temperature on the first day of exceedance can frequently be different than on the previous day, and because air temperature is an important driver of water temperature, it would be critical to control for air temperature for an analysis such as this to be meaningful. For example, in an example from Ranch Creek below CR 8315, average daily flow on August 8th, 2007, increased from the previous day, and still the maximum daily water temperature increased by > 5°C to fall above the acute standard (Table 1). According to the Final EIS, this result serves as evidence that stream flow and stream temperature are unrelated. Importantly, the concurrent 8° F increase in maximum air temperature likely played a significant role in this water temperature increase.

Table 1. Ranch Creek below CR 8315: maximum water temperature, flow and maximum air temperature

Date	Max water temp (°F)	Flow (cfs)	Max air temp (°F)
8/7/2007	61.2	4.3	67
8/8/2007	70.7	4.8	75

  As such, unless other factors influencing water temperature are controlled for in some way, the "additional data evaluation" section's approaches and conclusions are difficult to support.

- *Low flow frequency in July and August.* Despite the conclusion of the Final EIS three-phase analysis that flow is not a good predictor of water temperature, Chapter 5 states that impacts from the Project will not occur in either the Fraser River or Ranch Creek because the Project will not increase July and August low flows from the Full Use and Full Use with Project Condition (pp. 5-104, 5-105). Given that both of these streams are already impaired for temperature (including months other than July and August), that the rationale does not consider any factors other than flow, and that the stated low flows (Fraser River - 100 cfs;

Ranch Creek - 6 cfs) have not been demonstrated to be protective of temperature, this conclusion regarding Project impacts is difficult to support.

4. Ongoing temperature modeling. At several points, the Final EIS references the more scientifically rigorous water temperature analysis that is currently being conducted by Denver Water's contractors for the State of Colorado's CWA Section 401 Certification Process. For example, following a description of the three-phase water temperature analysis that is included within the Final EIS, the document states "these analyses are expected to be supplemented by dynamic stream temperature modeling performed in support of the Clean Water Act Section 401 water quality certification process administered by CDPHE separate from this EIS" (p. 4-175). The EPA is aware of this ongoing water temperature modeling effort as it was initiated, in part, in response to concerns raised by the EPA in meetings following up on the Draft EIS comments, and during more recent inter-agency meetings among the EPA, CDPHE, and Corps regarding the concerns on three-phase analysis approach. The EPA has long supported the use of a dynamic temperature model to evaluate impacts from this Project and to effectively apply mitigation, and we look forward to its completion. Because the temperature modeling being performed in support of Colorado's CWA Section 401 certification process has not yet been completed, the EPA cannot draw any conclusions regarding its sufficiency as a scientifically defensible disclosure of water temperature impacts expected to result from the Project.

Recommendations:

- Complete the dynamic temperature modeling and use it to estimate impact from the Project and also the sufficiency of proposed mitigation.
- See mitigation and monitoring and adaptive management sections for other recommendations.

C. Aquatic resources

For aquatic communities, there are numerous drivers that influence aquatic life and are critical to supporting aquatic communities and their habitat. Many of these drivers, including channel complexity, depth, velocity, substrate, and temperature, are related to flow. The accurate use of quantitative data and evaluations on changes in flow and flow-mediated habitat drivers is critical to inform the aquatic life impact analysis and conclusions in the Final EIS. We appreciate the inclusion of new information on current conditions, including the magnitude and effect of existing withdrawals on the West Slope, and potential for threshold changes to flow and aquatic life, as well as additional analyses and metrics (including dry-year frequency and sequences, flood frequency analysis, comparison to native flows, IHA metrics, and structural macroinvertebrate metrics) and evaluation points (including expanded PACSIM modeling nodes, and additional stream morphology analysis points) into the characterization of Project impacts. We recommend that any additional impacts disclosed in the dynamic temperature modeling analysis be utilized to inform conclusions on impacts to aquatic resources.

The expanded analysis provides a clearer picture the potential direct, indirect and cumulative effects associated with the action alternatives on aquatic resources. As stated in the cover letter, we are concerned that the impacts to the stream ecosystems on the west slope may be more substantial than outlined and characterized in the Final EIS. For example, in many of the Fraser and Williams Fork tributary streams, the Final EIS states that there will be a substantial increase in the number of zero flow days, reduced magnitude of average peak flows, reduced duration of high flow and flood events, continued vegetation encroachment into the channel, decreases in macroinvertebrate densities and loss of important macroinvertebrate functional groups associated with the action alternatives (Chapter 5). The Project effects exacerbate an existing degraded condition, where many of these streams are dewatered most of the year at the diversion structure and have already passed ecological tipping points (Chapter 3). In addition, all streams on the West Slope will incur extended dry year sequences and reduced magnitude and duration of high flow and flood events with the action alternatives, which can lead to long-term changes in habitat quality and availability. The EPA is concerned that, without appropriate mitigation, the Project's incremental effects could contribute to significant degradation of stream ecosystems on the West Slope (which contain riffle-pool sequences, special aquatic sites under CWA Section 404) (40 CFR 230.10(c)).

The evaluation of anticipated Project effects is focused on impacts to individual stream segments, without considering the broader watershed. Because there are a substantial number of tributary streams that will be similarly affected within the Fraser and Williams Fork basins, it is likely that minor adverse impacts in numerous individual streams across entire watersheds may affect larger-scale ecological processes or have broad ecosystem effects that are more than minor.

Recommendations:

- Consider any additional impacts disclosed in the dynamic temperature modeling analysis be utilized to inform conclusions on impacts to aquatic resources.
- Provide mitigation for incremental effects to aquatic resources in West Slope streams that cause or contribute to significant degradation.
- Consider impacts and potential mitigation efforts from a broader watershed scale, so that whole-ecosystem scale conclusions can be drawn.

D. Nutrients

1. Three Lakes. The Final EIS characterizes impacts to the Three Lakes as minor (in dry and most average years) to moderate (in wet and some average years) when comparing Current Conditions to Full Use with Project Condition (p. 4-193). The Project's specific contribution to these effects is characterized as no impact to negligible (less or equal 2%) based upon comparison of the Full Use of the Existing System to the Full Use of the Existing System with Project (p. 5-102). Both Grand Lake and Shadow Mountain are predicted to be affected by the Project in wet, average and dry years and Granby Reservoir is predicted to be affected in average and dry years.

The EPA appreciates the additional and improved analysis conducted for Shadow Mountain Reservoir to account for the Three Lakes Water-Quality Model's limitations in representing the DO impairment in Shadow Mountain (p. 4-194). The Final EIS predicts that the Full Use with Project Condition would adversely affect Shadow Mountain Reservoir's current DO impairment (p. 4-193). This conclusion has not been carried over to characterize Project effects in Chapter 5 nor does Chapter 4's presentation of results clearly reflect this conclusion. The Final EIS states that, from the

Current Condition to the Full Use with Project Condition the average DO change is a decrease of 0.25 mg/L, ranging from the greatest predicted decrease of 0.8 mg/L to an increase of 0.24 mg/L (p. 4-197 to 4-198). The EPA is concerned about the Project's potential to exacerbate DO impairment, per the State's CWA Section 303(d) list, at Shadow Mountain Reservoir. Our concerns are heightened because it is likely that the Final EIS may underestimate current and future DO problems in Shadow Mountain reservoir for the following reasons:

- The data used to characterize the Current Condition in Table 4.6.2-5 (1975-1989) do not reflect recent DO exceedances and the associated CWA Section 303(d) impairment. Because of this, exceedances may occur more frequently than presented in Table 4.6.2-5.
- The Final EIS notes that the analysis over-predicts DO concentrations at the impaired location, SM-DAM, and likely under-predicts standards exceedances (p. 4-197, Figure 4.6.2-7).

Recommendations:

- Provide mitigation to offset's the Project's contribution to the WQS exceedances. Options include providing dilution water during critical times reducing the overall nutrient loading to the Three Lakes System through point- or non-point source reductions.
- Utilize DO data that represent current conditions and reflect exceedances associated with the CWA Section 303(d) impairment.

2. Fraser River Watershed. The Final EIS predicts increases of in-stream TN average annual concentrations in the Fraser River and Ranch Creek from the Current Condition (2006) to the Full Use with Project Condition (2032) from 7% to 45%. Chapter 5 attempts to isolate the Project effect through characterization of the Full Use Condition (2022). This characterization attributes 2.3 to 3.6% of the total TN increases in average and wet years to the Project (Table 5.2-2).

The Final EIS predicts both increases and decreases of average annual total phosphorus (TP) concentrations in the Fraser River and Ranch Creek from the Current Condition (2006) to the Full Use with Project Condition (2032) from a decrease of 48% to an increase of 15%. Chapter 5 attempts to isolate the Project effect through characterization of the Full Use Condition (2022). This characterization identifies only increases in Fraser River and Ranch Creek TP in average and wet years from 3.1% to 4.8% (Table 5.2-3). Although the Final EIS anticipates effects from the Project, it concludes that the incremental effect of the Project is minimal (up to a 3% increase) and does not discuss mitigation. The EPA has concerns about these predicted impacts due to nutrients for the reasons described in the bullets below.

<u>Comparison to effects thresholds</u>

- The Current Condition and Full Use Condition with Project nutrient levels exceed, or are approaching, benchmarks associated with adverse impacts to aquatic life. Multiple benchmarks have been considered and presented in order to provide a frame of reference for the concentrations presented in the Final EIS.
    - The Current Condition for the Fraser River below the Fraser WWTP exceed a number of thresholds indicative of adverse impacts (as denoted by bold text in Table 2 below), including Colorado's interim TP standards for average and dry years (130

µg/L and 160 µg/L, respectively). The wet years Current Condition (104 µg/L) is very near the interim nutrient value.

- TN at the Fraser River below the Fraser wastewater treatment plant (WWTP) is predicted to increase from 742 µg/L at the Current Condition to 1,046 µg/L at the Full Use Condition and then 1,073 µg/L at the Full Use with Project Condition (Table 4.6.2-13). These values exceed some of the indicators identified with bold text in Table 2 below.
- High pH data at the Fraser at Tabernash are also available that may be indicative of negative effects from nutrients in the Fraser River (p. 4-200).

Table 2. Fraser River Current Conditions and Full Use with Project Conditions, and other benchmarks for adverse impacts associated with nutrients

Applicability/Indicator	TP, ug/L	TN, ug/L	Source
Fraser River - Current Condition			
Wet	104	641	Moffat Final EIS
Average	130	742	Moffat Final EIS
Dry	160	849	Moffat Final EIS
Fraser River – Full Use with Project Condition			
Wet	62	926	Moffat Final EIS
Average	73	1073	Moffat Final EIS
Dry	84	1236	Moffat Final EIS
Colorado Interim Nutrient Values			
Cold streams aquatic life	110	1250	Colorado WQCC. Regulation 31
Macroinvertebrate Community Metrics[1]			
Taxa richness		**250**	Yuan 2010
Taxa richness, primary consumer	**60**	**1000**	Evans-White et al. 2009
Taxa richness, secondary consumer	**90**	--	Evans-White et al. 2009
IBI	**19**	--	King & Richardson 2003
Various metrics	**87-91**	**600-1100**	Robertson et al. 2006
Various metrics	**90**	3300	Caskey et al. 2010
Impairment	--	**350-900**	Cited in Walker et al. 2006
Mortality from bacterial infestation	200	2000	Lemley & King 2000
Fish Community Metrics[2]			
Various metrics	**55-67**	**540**	Robertson et al. 2006
Various metrics	**42-129**	2400-2900	Caskey et al. 2010
Benthic Chlorophyll and Diatom Metrics[3]			
Various metrics	**39-74**	**870-1220**	Robertson et al. 2006
EPA Ecoregional Reference Site Criteria[4]			
Aggregate ecoregion: Western Forested Mountains	**10**	**120**	U.S. EPA
Aggregate ecoregion: Xeric West	**22**	**380**	U.S. EPA
Level 3 ecoregion:	**6**	**90**	U.S. EPA

[1]Taken from CDPHE's *Basis for Interim Values to Protect Aquatic Life in Rivers and Streams*, available at: ftp://ft.dphe.state.co.us/wqc/wqcc/31_85NutrientsRMH_2012/ProponentsPrehearing/WQCDex12.pdf
[2] Taken from CDPHE's *Basis for Interim Values to Protect Aquatic Life in Rivers and Streams*, available at: ftp://ft.dphe.state.co.us/wqc/wqcc/31_85NutrientsRMH_2012/ProponentsPrehearing/WQCDex12.pdf
[3]Taken from CDPHE's *Basis for Interim Values to Protect Aquatic Life in Rivers and Streams*, available at: ftp://ft.dphe.state.co.us/wqc/wqcc/31_85NutrientsRMH_2012/ProponentsPrehearing/WQCDex12.pdf
[4] http://www2.epa.gov/sites/production/files/documents/rivers2.pdf

Southern Rockies			
Montana Draft Proposed Nutrient Criteria[5]			
Northern Rockies, Idaho Batholith and Middle Rockies Ecoregions	**25-30**	**275-325**	Montana Department of Environmental Quality

The cold stream interim TP and TN interim values adopted by the Colorado Water Quality Control Commission (WQCC) in 2012 have not been approved by EPA, and so there is some uncertainty regarding whether these same values will continue to be used, particularly in the post-2022 implementation period. Monitoring of effluents and ambient waters is required by Regulation 85, and it is expected that new methods for deriving nutrient criteria will continue to be developed. Because all WQS are subject to triennial review, it is possible that the interim values will be updated at some point (which might mean either lower or higher interim values).

The WQCC has not yet applied nutrient standards downstream of point sources (this includes the Fraser River downstream of the Fraser WWTP), choosing instead to defer those decisions until the basin-wide WQS reviews beginning in 2022. The first opportunity in the Upper Colorado basin would be in 2024, but at that time dischargers can propose site-specific alternatives to the interim values, including temporary modifications. So again, there is uncertainty regarding both when numeric standards will be applied to waters downstream of point sources, and also what numbers will be applied.

Analytical uncertainty

- The Final EIS's characterization of Full Use Condition (2022) assumes implementation of Colorado's interim TP and TN values into water quality-based permitting. Regulation 85 anticipates 2022 as the beginning of water quality-based permitting not the end. Consequently, the Current Condition TP values may persist into the post-2022 period.
- The Winter Park WWTP and Granby average TN effluent concentrations (Table 4.6.2-7) for Current and Full Use with Project Conditions are slightly lower than the observed total inorganic nitrogen, a component of TN, values presented in Table 2 of AECOM 2013, leading to possible underestimation of effluent concentration.
- No measured data were available to verify current effluent total phosphorus concentration or whether 1 mg/L will be attained when Regulation 85 requirements apply (both mandated by Colorado Regulation 85: Nutrient Management Control Regulation).
- Uncertainty associated with analysis' modeling assumptions used (population growth and associated loading from WWTP and septics, TP concentration of the WWTP effluent, nutrient loading from land use, etc.) means that the predicted values and impacts could be higher or lower than expected.

Additional considerations

- The Final EIS does not include rationale for why the scope of analysis was limited to the Fraser River, Ranch Creek and Crooked Creek.
    - As the Final EIS notes, Crooked Creek is not affected by the Project.

[5] http://deq.mt.gov/wqinfo/standards/NumericNutrientCriteria.mcpx

    - Other tributaries for which the Project will be reducing flows could also be subject to nutrient impacts due to the associated dilution reduction. As the Final EIS notes, the non-point source loading of nutrients is present watershed-wide.
- The Fraser River's WQS antidegradation designation is reviewable,[6] meaning that it is subject to antidegradation review and that all the assimilative capacity associated with the nutrient standard may not be available to permitted dischargers, narrowing the acceptable in-stream concentrations.

Recommendations:

- Because of the Current Condition's elevated nutrient levels, the increases in TN and the uncertainty associated with implementation of the interim nutrient values, we recommend development of a mitigation plan within an adaptive management framework to prevent adverse effects due to the Project effects (up to 3% increase in TN, up to 15% increase in TP) and the uncertainty associated with the analyses and implementation of the interim nutrient values. These provisions are necessary to ensure the Project will not cause or contribute to further elevated nutrient concentrations, violation of the narrative standard, or adverse effects to aquatic resources both in the Fraser Basin and their related potential effects to the Three Lakes.
    - Monitoring of nutrients, chlorophyll, diatom composition, DO/pH and macroinvertebrates will provide a basis to identify adverse effects because algal and plant endpoints tend to be more sensitive to elevated nutrient concentrations than macroinvertebrates. The LBD already identifies macroinvertebrate monitoring. We recommend expanding the suite of monitoring parameters to also include nutrients, DO, pH and chlorophyll and diatom composition if the adaptive management mechanism is implemented.
    - The adaptive management plan should incorporate thresholds for decision-making and mitigation that would occur should those thresholds be reached.
    - Mitigation options include nonpoint source nutrient reductions and funding of WWTP treatment (points source) upgrades, or plant optimization. Optimization is a tool that, when effectively implemented, can achieve remarkable nutrient reductions (sometimes up to 50%[7]) at much lower costs and within much shorter timeframes (~3 years).[8]
- Conduct monitoring or collect available data to confirm the effluent concentration values used for Winter Park and Granby.

E. Permitted dischargers. The Final EIS discloses that the discharge permits for several Wastewater Treatment Plants (WWTPs) on or near Dillon Reservoir may be affected by increases in water surface elevation variation and the duration of lower reservoir elevation levels in Dillon

[6] Colorado Code of Regulations, Regulation 31, The Basic Standards and Methodologies for Surface Water, Sections 31.17 and 3.8 (5 CCR 1002-31.17, 31.8)

[7] Paul LaVigne, Montana Department of Environmental Quality, personal communication with Tina Laidlaw, EPA Region 8, March 24, 2014.

[8] Wastewater Nitrogen & Phosphorus Removal without Plant Upgrades: Optimizing the Operation of Existing Facilities. The Water Planet Company. 10 December 2013 Presentation to EPA Region 8.

Reservoir. Reservoir water surface elevation will fluctuate an additional 3 feet between the Full Use and Full Use with Project Condition and generally decrease across alternatives (p. 5-100, Table H-2.5). The Final EIS identifies the Town of Frisco WWTP, the Snake River WWTP and the Farmer's Korner WWTP, as possibly having new, more stringent surface water discharge permit limits due to reductions in low flows and loss of assimilative capacity (p. 4-177) as a result of the Project.

Recommendations:

- Develop a plan to monitor for, and mitigate these effects. Options include:
  - A communication plan with affected dischargers regarding permit changes to determine if changes occur as a result of this Project.
  - Development of mitigation projects to maintain or increase the assimilative capacity of affected waterbodies to offset these impacts.
    - Many of the impacts associated with increased nutrient concentrations result from the diversion of higher quality water. We recommend that projects developed to reduce and/or maintain nutrients loadings include nonpoint source reductions.
    - Provide funding for WWTP treatment upgrades to offset the effects of reduced assimilative capacity through optimization or treatment upgrades.

E. Water quality other than temperature and nutrients.

1. Data availability. Water quality concentrations can often have significant seasonal and flow-related variability, and this information is therefore important to understanding the Project's potential impact. The Final EIS states that "sufficient water quality data do not exist to appropriately characterize the seasonal fluctuations in existing water quality within the Project area" (p. 3-66, p. 4-175) underscoring the importance of understanding what information was available to support the analyses. With limited data and a lack of seasonal data, it would be expected that conclusions regarding Project impact would be limited or qualified; however, for many constituents, (*e.g.*, copper, lead, impacts from WWTPs, and nutrients) the document concludes that the Project will not have an effect. To clearly distinguish between situations where an impact is unknown versus negligible or non-existent, the EPA recommends that data availability concerns be further explored and resolved prior to the ROD and the State's CWA Section 401 Certification process. We recommend consideration be given to whether the data available for a particular constituent are sufficient to reach an impact conclusion. CDPHE's minimum data requirements described in its 303(d) listing methodology may be helpful for this.[9]

Additionally, the Final EIS indicates that some data were eliminated as outliers (pp. 3-64, 3-65). In consideration of the already data-limited situation, it would be very helpful to provide the data that were eliminated and the basis for elimination, for forthcoming water quality analyses to support the CWA Section 404 permitting.

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[9] http://www.colorado.gov/cs/Satellite?blobcol=urldata&blobheadername1=Content-Disposition&blobheadername2=Content-Type&blobheadervalue1=inline%3B+filename%3D%222012+303%28d%29+Listing+Methodology.pdf%22&blobheadervalue2=application%2Fpdf&blobkey=id&blobtable=MungoBlobs&blobwhere=1251807346660&ssbinary=true

2. Impacts due to WWTPs and flow changes. The methods used to evaluate the increase in the proportion of water that is made up of WWTP effluent due to the increased diversions does not appear to accurately evaluate the associated potential change in water quality. We are concerned that the Final EIS:

- does not consider increases in upstream / background concentrations due to the reduction of flows;
- assumes WWTP flows at only 80% of their capacity (p. 4-250); and
- utilizes a threshold of 10% flow change between the Full Use and Full Use with Project Condition to assess the potential for water quality impacts (pp. 5-109,4-250).

Background changes in water quality may occur due to reductions in dilution associated with a permitted discharger or some other pollutant source.

The Final EIS assumes WWTP discharge at 80% of their design capacity based upon "State regulations stipulate[ing] that when WWTPs reach 80% of capacity, *design* for plant expansion should begin and new construction should start prior to reaching 95% of capacity" (emphasis added) (p. 4-250). This statement appears to indicate that, because construction may not occur until 95% of capacity has been reached, use of a higher flow, such as 95% of capacity would make more sense. Assuming a lower flow means that more of the instream flow is assumed to be non-effluent and, therefore, may underestimate the changes associated with the increase in the discharge.

As the EPA has previously commented, use of a 10% threshold may miss important changes when water quality is nearing, or already exceeding, water quality standards such as in the Fraser River, the Williams Fork, the Colorado River, the South Platte River, and the Blue River.

3. Metals. Identification of the location, flow conditions and seasonality of exceedances is essential to understanding whether the Project will change the associated flows and, in doing so, affect the occurrence of exceedances. The Project will affect low to high flows throughout wet and average years (Appendix H-3) and, consequently, has the potential to affect water quality over a range of conditions. The Final EIS does not provide a clear basis for why the Project will not affect water quality on the basis of either 1) affected flow conditions and seasonality, or 2) spatial occurrence of sources.

As the Final EIS notes, in order to actually quantify the impacts of the Project once the potential for them has been identified, it is necessary to understand the pollutant sources (p. 4-199). Once source information is understood, mass balance or load/concentration duration curves techniques could be used to quantify impacts. The Final EIS already contains flow duration curves in Appendix H-9 to which information regarding pollutant load or concentration and the associated criteria could be added.

- ***Copper.*** The Project effects on the State's existing copper "monitoring and evaluation" listing for the Fraser River from the town of Fraser to the confluence with the Colorado River appear to be unknown. This reach of the Fraser River is downstream of the diversions and, therefore, copper concentrations are possibly being diluted by the water that will be diverted The Final EIS confirms that WQS exceedances not only occur downstream of the diversions but also at times when the Project will be operating. The Final EIS documents that "sample sites that point out a high level of copper" occur upstream of the diversions (p. 4-199); however, it appears there are no data or information regarding whether those data showed higher or lower copper levels than the downstream water. It would be helpful for the water quality analysis to provide a clearer rationale for these conclusions and to identify copper sources in order to better support its conclusion.

- ***Iron and Lead.*** The Project effects on the existing iron and lead WQS exceedances on the Fraser River from Tabernash to Granby appear to be unknown, but there is potential for the Project to exacerbate existing exceedances because of the Project's flow reductions. It is unclear why the Final EIS identifies permit limits in the Moffat tunnel discharge permit as a possible means to resolve lead and iron exceedances. The lead and iron exceedances occur downstream of Fraser, approximately five miles downstream of the Moffat tunnel discharge. It would be helpful for the water quality analysis to more explicitly explain whether data are available in the stretch in between the tunnel discharge and Fraser and, if so, what those data show with respect to iron and lead concentrations.

Recommendations:

- Identify the number of data points and sampling dates to the tables in Chapter 3 that summarize data.
- Consider whether an impact is unknown versus negligible in light of data availability.
- Describe or provide data eliminated as outliers to assure that no useful data were lost.
- Collect additional data or identify additional data sources where necessary to characterize the seasonality of exceedances, and potential sources (at least at a geospatial basis), of key contaminants such as those with existing WQS exceedances.

II. Monitoring

Baseline verification. The uncertainty associated with the Full Use Condition baseline anticipated to occur in 2022 and the assumptions built into it argue strongly for verification monitoring for nutrients, temperature and populations of aquatic organisms. The EPA recommends that pre-Project monitoring be conducted for a minimum of five years prior to Project implementation to either verify or adjust the Full Use Condition baseline and enable implementation of effective mitigation.

Mitigation effectiveness and impact verification. The EPA recommends that monitoring also be developed to address the effectiveness of mitigation and verify that adverse impacts are accurately predicted and not exceeding regulatory thresholds, effects thresholds or permit conditions. In addition to the constituents identified for monitoring in LBD (*e.g.*, benthic macroinvertebrates and temperature), monitoring will also be important for nutrients and metals in the Fraser River and nutrients and DO in the Three Lakes System.

III. Adaptive Management

The Colorado River Cooperative Agreement and the Agreement with Grand County outline a process for adaptive management known as LBD. The language in Appendix M indicates that Denver Water will request that it be added as CWA Section 404 permit condition. This measure will be important to incorporate as a mitigation for this Project in order to address the uncertainties associated with the Project effects and the baseline condition at the time of Project commencement (*i.e.,* the Full Use Condition) for resources in Grand County. It identifies important monitoring for a number of constituents. The LBD framework does not incorporate a framework for nutrient or metals impacts to the Fraser or thresholds to evaluate Project effects.

It is important for the LBD process to have a clear operating framework that identifies unacceptable impacts and thresholds for action to prevent those unacceptable impacts. In its current form the LBD process does not include such a framework. The EPA recommends expansion of the LBD framework to encompass more thresholds and actions associated with those thresholds.

IV. Mitigation

The Final EIS identifies potential impacts and inadequately defines others. The ROD and the CWA Section 404 permit conditions must require mitigation to offset these effects.

A. Incremental effects. In determining what resource impacts would require mitigation, the Final EIS does not appear to have considered the significance of the incremental effects of the Project where it would likely exacerbate current or future impaired or degraded conditions. Even where the document concludes effects to be "minor," incremental effects that will contribute to significant degradation or violation of WQS will require mitigation or minimization measures to ensure the Project is compliant with the CWA. The mitigation proposal does not include measures to address West Slope water quality nor demonstrate that the stream habitat restoration proposal for the Fraser and Williams Fork Basins and the North Fork of the South Platte is capable of offsetting the associated impacts. We also note that the stream habitat restoration is described as a pre-Project enhancement through the Colorado River Cooperative Agreement, implying that it is not intended to address Project effects. Consequently, we have a concern that the lack, and amount of, mitigation proposed do not fully to offset the water quality and aquatic resource impacts to the Fraser and Williams Fork Basins, and the Upper Colorado River associated with the incremental changes caused by the Project.

Recommendation to ensure CWA compliance:

- Consider additional mitigation or minimization measures where there is potential for incremental Project effects to contribute to significant degradation or violation of WQS. This consideration might encompass the measures identified in the Mitigation Options section, below.
- Demonstrate how the monetary contributions were determined and whether these amounts will fully offset the functional and habitat losses of the Project, including the incremental

effects. If they do not fully offset the incremental effects of the Project, additional mitigation for adverse effects will need to be considered.

- Ensure that the associated monitoring requirements are sufficient to identify Project effects and target required mitigation efforts.

B. Temperature. The conceptual mitigation package (Appendix M-1) contains several commitments for proposed mitigation to offset the Project effects on water temperature identified in the Moffat Final EIS. Specifically, for the Fraser River Basin, Table 5 of Appendix M offers the following:

Project Effects Identified in the EIS	Proposed Mitigation
<u>Fraser River</u> Ranch Creek could have moderate adverse impacts due to an increased frequency of elevated stream temperatures Fraser River downstream of the town of Fraser could have negligible to minor impacts due to increased frequency of elevated stream temperatures	DW will monitor stream temperature on Ranch Creek and the Fraser River If temperature standards are exceeded between July 15 and August 31, DW will bypass up to 250 AF of water (Refer to Section 3 Additional Environmental Protections in Grand County for additional DW commitments to address stream temperature issues in the Fraser River Basin)

The EPA appreciates Denver Water's willingness to mitigate potential water temperature impacts resulting from the expanded withdrawal of waters from the upper Colorado River basin. Based on our review, we have several concerns on the mitigation as proposed:

- As detailed above, the range of water temperature impacts disclosed within the Moffat Final EIS is not supported by the existing scientific record. Without sufficient impact identification, it is not possible to determine whether the proposed water temperature mitigation measures are adequate.
- Because the spatial scope was constrained during Phase 1 of the Moffat Final EIS water temperature analysis, many stream reaches under the influence of the proposed Project have gone un-assessed and no monitoring is proposed. It is very possible that dynamic temperature modeling or Project monitoring will identify additional stream reaches where the Project may contribute to post-Full Use WQS violations.
- The Final EIS does not justify the restricted temporal scope of the proposed water temperature mitigation (July 15th through August 31st). The Project is forecast to divert significant volumes of water during other months of the year (May and June), and if water temperature impacts result that contribute to numeric or narrative WQS exceedances, mitigation will be necessary. It is important that the temporal scope of temperature mitigation be expanded to assure the Project does not contribute to exceeding WQS *during the full period in which the proposed Project may divert water*.
- The Final EIS does not demonstrate that 250 AF of water is sufficient to mitigate potential water temperature problems likely to arise from the Project. Further, the committed 250 AF has been restricted to be bypassed at a maximum rate of 4 cfs. There has been no demonstration that 4 cfs is a sufficient flow volume to make a thermal difference at locations

in the Fraser system (or downstream in the Colorado River) that are likely to experience water temperature problems. We recommend the dynamic temperature model be robust enough to predict temperature impacts throughout the affected reaches and across the operating season of the Project in order to identify mitigation options to assure the Project does not contribute to WQS exceedances. Ideally, the dynamic temperature model will enable various mitigation strategies to be tested for effectiveness and efficiency.

- The mitigation response triggers for bypass of water are currently set at the acute and chronic water temperature standards (DM and MWAT respectively). No demonstration has been made that water released in response to these triggers will be timely enough to mitigate the potential for the exceedance of these biologically-based water quality standards.
- This section also states that the LBD process will determine which of Denver Water's facilities should bypass the 250 AF. Section B2 of the "Voluntary Enhancements for Aquatic Resources" section of Appendix M-1 (p. 35) details additional water temperature monitoring that will be completed as a part of the LBD process. This additional water temperature monitoring is an essential component to informing future mitigation actions, including the effective utilization of limited volumes of water for water temperature mitigation purposes. The EPA strongly encourages the initiation of this additional data collection effort as soon as practicable, as the resultant data would also help to evaluate the sufficiency of mitigation commitments contained within this Conceptual Mitigation plan.
- Within the "Additional Environmental Protections in Grand County" section (Appendix M-1, pp. 31-32), several additional environmental protection actions are identified.
    - In Ranch Creek, if the appropriate Response Trigger is reached, "at its Ranch Creek diversion, DW will bypass an amount of water up to the natural inflow at the Ranch Creek diversion that will maintain the flow in Ranch Creek at the USGS gaging station near Fraser, CO at 6 cfs (which is 2 cfs above the CWCB's instream flow right)." No demonstration has been made that 6 cfs at the USGS gaging station near Fraser, CO is sufficient to avoid or mitigate water temperature exceedances. The assurance that this flow is greater than the CWCB's instream flow right is unrelated to water temperature impacts, as the determination of the instream flow right likely did not factor in water temperature in its development.
    - In the Fraser River basin, similar temperature-triggered bypass commitments are made for the Fraser River and/or Jim Creek diversions (up to 14 cfs at the Winter Park USGS gage). The same questions raised above for the "additional environmental protection" commitments in Ranch Creek apply here.

D. Mitigation Opportunities

It would be helpful to better understand options available for West Slope mitigation (*e.g.*, operational flexibility, system-level modification) outside of the Colorado River Cooperative Agreement, the Grand County Agreement and the State Fish and Wildlife Mitigation Plans in order to identify options to fully offset effects. We recommend consideration of the following options as the Corps moves forward.

Bypass flows. As identified in the Final EIS, bypass flows during low-flow periods appear to sustain aquatic communities and may buffer them from crossing ecological tipping points. Bypass flows also have the potential to offset water quality and continued vegetation encroachment into the channel. Because there are several streams where the proposed Project may push the system past ecological tipping points (as well as numerous systems that the Final EIS identifies as already past ecological tipping points) or cause or contribute to water quality exceedances, bypass flows may be an important mitigation consideration to offset some of the potential Project impacts. Re-operation of flows (including, but not limited to bypass flows) may be a useful tool to compensate for the incremental impacts associated with this Project.

In addition to consideration of additional bypass flows during low-flow periods, we recommend consideration of bypass flushing flows to offset impacts associated with reduced magnitude and duration of peak flows within the Fraser and Williams Fork River basins. Implementation of the 250 AF as a 4 cfs maximum, identified as temperature mitigation and as an enhancement, would not offset the Project's primary effects which are during higher flows. We recommend a substantive evaluation of how the 250 AF may be implemented beyond a maximum of 4 cfs in order to offset Project flow effects such as the reduced magnitude of average peak flows and reduced duration of high flow and flood events associated with the action alternatives. Additionally, we recommend consideration of bypass flows on a watershed-level as means to provide higher flows. For example, evaluate whether higher flows could be provided to fewer stream segments on a multi-year cyclical basis to reduce impacts to aquatic resources associated with the peak flow reductions and flood durations.

Replacement of riffle-pool complexes. Because of the proposed loss of this special aquatic site due to expansion of Gross Reservoir, the EPA recommends a coordinated effort with the resource agencies to identify potential in-kind rehabilitation, enhancement and preservation opportunities in the area consistent with the CWA Section 404-Mitigation Rule (40 CFR Part 230 Subpart J). Under the Rule, preservation as a mitigation measure must be provided in conjunction with rehabilitation and enhancement methods and cannot stand on its own. We are committed to work with the Corps to identify practicable mitigation measures that will further minimize and compensate for these proposed Project impacts.

Diversion structure relocation. The Final EIS does not consider infrastructure changes such as the relocation of diversion structures to a downstream location as a means to offset Project impacts. As demonstrated by the Final EIS, tributary flows are often completely diverted, leading to a periodic, total loss of habitat. For example, if the diversion structures were located further downstream where multiple tributaries would feed a single diversion structure, the areas upstream could be restored, increasing the amount and quality of wetted habitat and habitat connectivity in those streams. Although diversion structure relocation may require pumping of water uphill, the water may only need to be pumped to the Denver Water collection point on the West Slope, at which point diversions can continue to be gravity-driven.

Nutrient source reductions or treatment upgrade funding. As discussed in the Water Quality Impacts Section above, the Final EIS does not evaluate opportunities to offset impacts to nutrients through non-point source reductions or funding WWTP upgrades. We recommend an evaluation of opportunities to offset the Project effect.

Recommendations:

- Evaluate what bypass flows and operational changes are available as possible compensatory mitigation requirements.
- Assess bypass flow implementation on a watershed-level to mitigate the loss of higher flows.
- Identify potential in-kind rehabilitation, enhancement and preservation opportunities to offset the loss of riffle-pool complexes.
- Evaluate opportunities to move diversion structures lower in the watershed in order to increase the wetted habitat.
- Analyze opportunities to mitigate the Project effect on nutrient concentrations through nonpoint source reductions or funding for WWTP treatment improvement.

IV. Preliminary comments - *Preliminary Section 404(b)(1) Guidelines Analysis*

Recognizing that additional changes will occur in the Corps' compliance documentation before the ROD, we are providing preliminary comments on Appendix K, Preliminary Section 404(b)(1) Guidelines Analysis. The Guidelines Analysis in Appendix K is a preliminary evaluation of compliance with the regulations prior to both CWA Section 404 permit issuance and Section 401 Certification, which will likely be revised prior to the ROD. Several specific regulatory compliance criteria are further described below for consideration as the Corps moves forward with the CWA Section 404 process.

Page K-27, Section 3.1.3 Water Quality Standards (230.10(b)): The document states that as evaluated in Section 5.2 of the Final EIS, none of the Project alternatives violate applicable State WQS. The regulation at 40 CFR 230.10(b) states that no discharge of dredged or fill material shall be permitted if it "causes or contributes" to violation of any applicable State water quality standard. The distinction is critical in this context as reduction in flows on the West Slope will likely contribute to violations of WQS in streams already showing impairment. The applicant's compliance with CWA §230.10(b) paragraph focuses mainly on the Gross Reservoir site and steps to be taken for discharges associated with the reservoir construction, yet the majority of the WQS concerns reside on the West Slope (*i.e.,* temperature and aquatic life in Fraser River, temperature in Ranch Creek, aquatic life in Vasquez Creek) which are not disclosed in this compliance requirement and do not appear to be taken into account in the preliminary Guidelines analysis.

Page K-28, Section 3.1.6 Significant Degradation of Waters of the U.S. (230.10(c)): The Corps has taken the position that with avoidance, minimization, and compensation of adverse of impacts the Project would not cause or contribute to significant degradation. The regulation at 40 CFR §230.10(c) prohibits discharges that "cause or contribute" to significant degradation and findings of significant degradation are based upon determination of both individual (direct and secondary) and cumulative effects on the aquatic ecosystem (40 CFR §230.11). Because many of the streams and waterbodies affected by the Project already have impaired water quality and adverse aquatic ecosystem impacts from past water withdrawals, additional withdrawals from the Current Condition (2006) to the Full Use Condition (2022) and under the action alternatives will likely contribute to further aquatic ecosystem degradation. Without adequate mitigation (*i.e.*, increasing flows in existing impaired streams or creating additional stream habitat mitigation credits, as streams are considered a difficult-to-replace (DTR) resource under the 2008 Mitigation Rule), the Project will further contribute to this degradation. Compensatory mitigation of stream habitat may be technically challenging particularly if it involves replacing special aquatic sites, including riffle pool complexes.

Page K-28 Section 3.1.7 Avoidance and Minimization (230.10(d)): Mitigation can be used to offset the incremental Project effects such that the Project does not contribute to significant degradation and, therefore, we recommend mitigation for this Project include sufficient detail for each resource and the associated functions considered in the compensatory mitigation plan to demonstrate that the full impact associated with the Project will be offset. As mentioned throughout this comment letter, the documentation of proposed mitigation for project impacts is inadequate to determine compliance with this section of the Guidelines.

Page K-34 Section 3.2.2 Secondary Effects: Secondary effects in this section of the Final EIS are based on the CEQ's definition of secondary. Because these effects are evaluated within the context of compliance with the CWA, it is more appropriate that the compliance analysis use the Section 404(b)(1) Guidelines definition found at 40 CFR §230.11(h), which are "effects on an aquatic ecosystem that are associated with a discharge of dredged or fill materials, but do not result from the actual placement of the dredged or fill materials." The EPA considers all secondary or indirect adverse impacts associated with the discharge that are functionally related to the discharge, which includes all indirect impacts that will occur "but for" the expansion of Gross Reservoir (the discharge), including impacts associated with additional withdrawals that would fill the expanded reservoir.

Page K-74 Section 5.2.2 Proposed Action: Approximately 5.48 acres of wetlands and waters of the U.S. would be adversely impacted by the proposed action at Gross Reservoir. As mentioned above, increases in habitat for fish and wildlife for fish and invertebrates resulting from expansion of Gross Reservoir do not provide in-kind replacement of proposed lost riffle-pool complexes.